OCCASIONAL PAPER NO. 102 May 18, 1942

RECOMMENDATIONS FOR KILLING SCRUB OAKS AND OTHER UNDESIRABLE TREES

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The Occasional Papers of the Southern Forest Experiment Station present information on current southern forestry problems under investigation at the station. In some cases, these contributions were first presented as addresses to a limited group of people, and as "occasional papers" they can reach a much wider audience. In other cases, they are summaries of investigations prepared especially to give a report of the progress made in a particular field of research. In any case, the statements herein contained should be considered subject to correction or modification as further data are obtained.

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Summary

Three methods of killing scrub oaks were recently tested in southern Mississippi. These included: (1) Cutting trees above and below the surface of the ground, (2) Girdling the stems at the base by removing the bark and by killing the cambium and the bark with flames from a blow torch, and (3) Poisoning.

Most of the trees that were cut produced vigorous sprouts. Girdling or removing a strip of bark around the base of the tree for a distance of about one foot above ground yielded fairly satisfactory results. Although the crowns died slowly no sprouts developed from either the root collar or the stem. This method, although costly and requiring very careful work, is recommended where it is unsafe to use poison. Burning the butts of the trees with a blow torch proved too ineffective for practical use.

The most successful and cheapest method tested consisted of injecting sodium arsenite into the roots or stems of trees, through the use of a tool developed especially for this purpose. Most of the trees so treated died in a relatively short time. Caution is needed in the use of sodium arsenite. The poison is deadly to both animals and plants and should be handled with extreme care.

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On most of the forest land in the South there are many trees of no present or potential value, yet of sufficient vigor to crowd out or seriously hinder the growth of valuable trees. Such trees are as detrimental in a forest as weeds in a field of cotton or corn. In the pine lands of the Lower South the most common "weed trees" are scrub oaks, which include blackjack (Quercus marilandica Muench.), bluejack (Q. cinerea Mich.), turkey (Q. catesbaei Mich.) and dwarf post oaks (Q. stellata margaretta Sarg.). Although by no means the only weed trees, these scrub oaks are especially undesirable because of their notably vigorous and persistent sprouting following cutting or fire. Scrub oaks are also instrumental in spreading the canker-forming rust disease (Cronartium fusiforme (A and K) Hedg. and Hunt.), which kills or deforms the stems of southern pine seedlings, saplings, and nursery stock. One generation of this disease occurs on oak leaves, and the spores produced there are responsible for infecting young pines. Obviously, therefore, the presence of oaks in the vicinity of forest nurseries is undesirable. In the aggregate, hundreds of thousands of acres in the South are overrun with scrub oaks and other trees of little or no value. To eradicate such trees requires not merely the killing of the tops or crowns but also the prevention of sprouting, and this has generally been found difficult and expensive to accomplish. This report describes a recently developed method that is both cheap and effective. Another method that has produced fairly satisfactory results, although at a greater cost, is also discussed.

Cutting and Girdling

Various methods have been used in attempting to kill undesirable trees. If a tree is cut down, or partially cut through and bent over, sprouts usually develop. In general the smaller the tree the more numerous and vigorous are the sprouts. Scrub oaks are usually of the small sizes that sprout most prolifically. Vigorous sprouting often nullifies the benefit accomplished by removing the top of an undesirable tree.

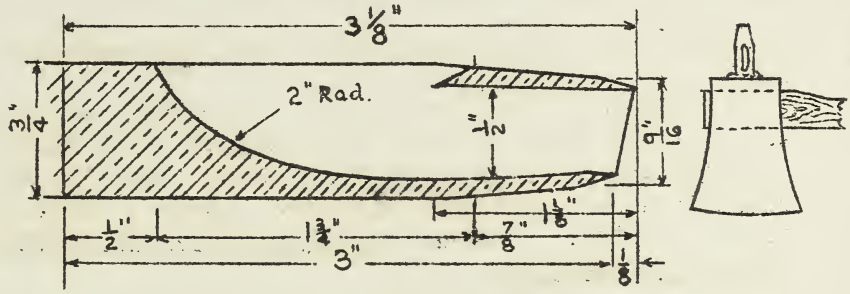
The results of cutting scrub oaks were recently studied in southern Mississippi. A total of 410 trees were cut at a height of about one foot above ground, and 1123 trees were cut just below the root collar. The trees in both tests ranged from 2 to 4 inches in diameter at breast height. Of the trees cut above ground only 5 percent of the stumps were dead after two years, while the remaining 95 percent sprouted vigorously. Cutting below the root collar produced better results since 38 percent of the stumps showed no sprouts after two years. Mortality was about twice as great in trees cut in late autumn and in winter as in trees cut in spring and in midsummer.

Trees are sometimes killed by girdling, i.e., cutting through the vital cambium tissue between the bark and the wood in a continuous ring around the trunk. Girdling is usually effective in killing trees more than about 10 - 12 inches in diameter, but smaller trees usually produce vigorous sprouts below the girdle. The effectiveness of girdling in killing scrub oaks was recently tested in southern Mississippi. The treatments consisted of removing the bark from around the base of 93 scrub oaks to a height of about one foot above the root collar and of burning the bark at the butts of 113 scrub oaks with a blow torch. The latter treatment was designed to kill the cambium at the base of the trees. Two years later, the removal of bark at the base had resulted in the death of 51 percent of the trees so treated. Where the bark was not completely removed and narrow strips of living tissue bridged the girdle, the trees remained alive though in a very weak condition. Burning at the butt killed only 27 percent of the trees so treated. The burning proved most effective when done in winter, but the removal of bark produced best results when done in midsummer.

Poisoning

Poisons have frequently been used for killing undesirable trees, but usually have been dangerous to use or expensive to apply effectively, or both. Poisons can be used as sprays, as applications around the trunks or roots of trees, or as injections into trees. Sodium chlorate has been found effective when sprayed on sprouts arising from stumps. Owing to its inflammability, however, this poison can be used with reasonable safety only under certain limited conditions and with particular care. When applied as injections into trees sodium chlorate has been found to be ineffective. Sodium chlorate was injected into 260 trees in recent tests in southern Mississippi but only 6 percent were dead two years after treatment. Sodium arsenite has been used successfully by applying it in "basins" at the base of stumps, or in "frills" or girdles around the stem, but these methods are dangerous due to the accessibility of the poison to livestock. In general, poisoning has been more successful than either cutting or girdling in killing trees, and sodium arsenite has been found to be the most effective poison.

A new, safer, cheaper, and more effective method for using sodium arsenite has been developed recently by the Southern Forest Experiment Station. It involves applying sodium arsenite in holes punched in the stem or roots of trees with a special tool. When this poison was injected into the stems of 165 scrub oaks in southern Mississippi, 73 percent died within two months. Injection of sodium arsenite into the roots of 175 scrub oaks resulted in a mortality of 81 percent. The injections were tested at four dates (January, April, July, and November) in trees from two to six inches in diameter at breast height. Trees treated during the summer showed the highest mortality, although the differences associated with season were small.



SECTIONAL VIEW THROUGH TOOL AXE HEAD

FIG. 1

Materials and Equipment Needed in Using Sodium Arsenite

The materials and equipment needed are as follows:

1. White arsenic (arsenic trioxide).
2. Caustic soda (sodium hydroxide) flakes.
3. Water.
4. A metal container (10-gallon capacity).
5. Locomotive engineer's oil can with thumb lever (one-quart capacity).
6. Leather or rubber gloves.
7. A tool for making holes in trees.

If only a few trees are to be treated, the holes can be drilled with a brace and bit, but if many trees are to be treated a special hole-punching tool developed by the Southern Forest Experiment Station is recommended. This tool consists of an ax with a special punch made from tool steel and attached to the ax head as shown in Fig. 1. The opening in the inside of the attachment is oval in shape and measures 1-3/4 inches by 1/2 inch. The cutting edge is 1/8 inch shorter at one side than at the

other to facilitate the punching of holes at an angle of about 45 degrees. The attachment is welded on the ax so that the short side is upward when the punch is driven into the tree. One stroke removes a core of wood 1/2 inch in diameter and about 1 inch long. A public-service patent for this hole-punching ax has been applied for by the Southern Forest Experiment Station. Names of manufacturers of the tool will be furnished on request.

Preparation of Sodium Arsenite

To make approximately one gallon of sodium arsenite, or enough to fill about 500 average holes, proceed as follows:

1. Weigh out 8 pounds of white arsenic powder into a metal can.
2. Weigh out 2 pounds of caustic soda flakes into the same can.
3. Thoroughly stir the two chemicals in the dry condition with a wooden paddle.
4. When the chemicals are well mixed, add 3 quarts of water very slowly while stirring the mixture, which will begin to boil soon after the water is added. When the boiling ceases the two chemicals will have formed a clear, thick, heavy solution. This is sodium arsenite, an extremely poisonous compound.

CAUTION: The poison should be prepared out of doors. Avoid breathing the fumes that develop. Wear a mask or cloth over nose and mouth during the preparation. Avoid spattering the chemicals on the skin or into the eyes.

If more poison is needed, use more chemicals and water in the proportions indicated above, i.e., for every pound of caustic soda use 4 pounds of white arsenic and 1-1/2 quarts of water.

Application of Sodium Arsenite

To apply sodium arsenite by the injection method, strike the main roots of the tree near the root collar with the hole-punching tool, or bore a hole there. Fill the hole with poison from the oil can by pressing the lever lightly with the thumb. By careful manipulation the hole can be filled with poison without spilling any of it on the tree or on the ground. It is very important to prevent spilling the poison. If any appreciable amount is spilled on the ground or on the tree, the salty taste of the sodium arsenite may attract cattle or other animals. The poison is deadly to animals as well as to plants.

The amount of poison held in a hole punched with the special tool varies from 5 to 10 cubic centimeters, depending on the force of the blow. The average hole holds about 6 cubic centimeters. The number of holes needed depends on the size of the tree. A tree up to 3 inches in diameter at breast height usually can be killed with poison placed in one hole in the root or in the stem. For each additional 2 inches in diameter an extra hole is needed, so that a 5-inch tree requires two holes, a 7-inch tree three holes, etc. The experimental results obtained to date indicate that poisoning in midsummer yields best results.

The cost of poisoning will depend on the current prices of the chemicals, the quantity in which they are purchased, and the size and distribution of the trees. On an experimental basis, scrub oaks of average size were killed at a cost of less than one cent per tree.

Precautions in Using Sodium Arsenite

Sodium arsenite is extremely poisonous and should be handled with utmost care. After using the poison the operator should wash his hands thoroughly with soap and water, and no food should be touched by the hands before they are thoroughly washed. All equipment and materials should be kept out of reach of children and animals, and should be plainly marked as to their use and contents. A container in which sodium arsenite has been kept should never be used for any other purpose.

This method of poisoning trees is recommended only for areas closed to grazing. If the method is used in grazed areas, however, livestock should first be removed and should not be permitted on the area until at least three days have elapsed following the last poison treatments. Under summer conditions the poison is absorbed by the tree in less than thirty minutes, but in winter the absorption is much slower. It is thought, however, that sodium arsenite will be completely absorbed in three days under even the most adverse weather conditions.

No definite information is yet available on the safety of using wood from poisoned trees for fuel. Until such information is available, wood from poisoned trees should not be used for fuel because arsenic may be contained in the smoke and the fumes would then be poisonous.

For further information address the Director, Southern Forest Experiment Station, New Orleans, Louisiana.